6.5.2.4 Tile pre-processor

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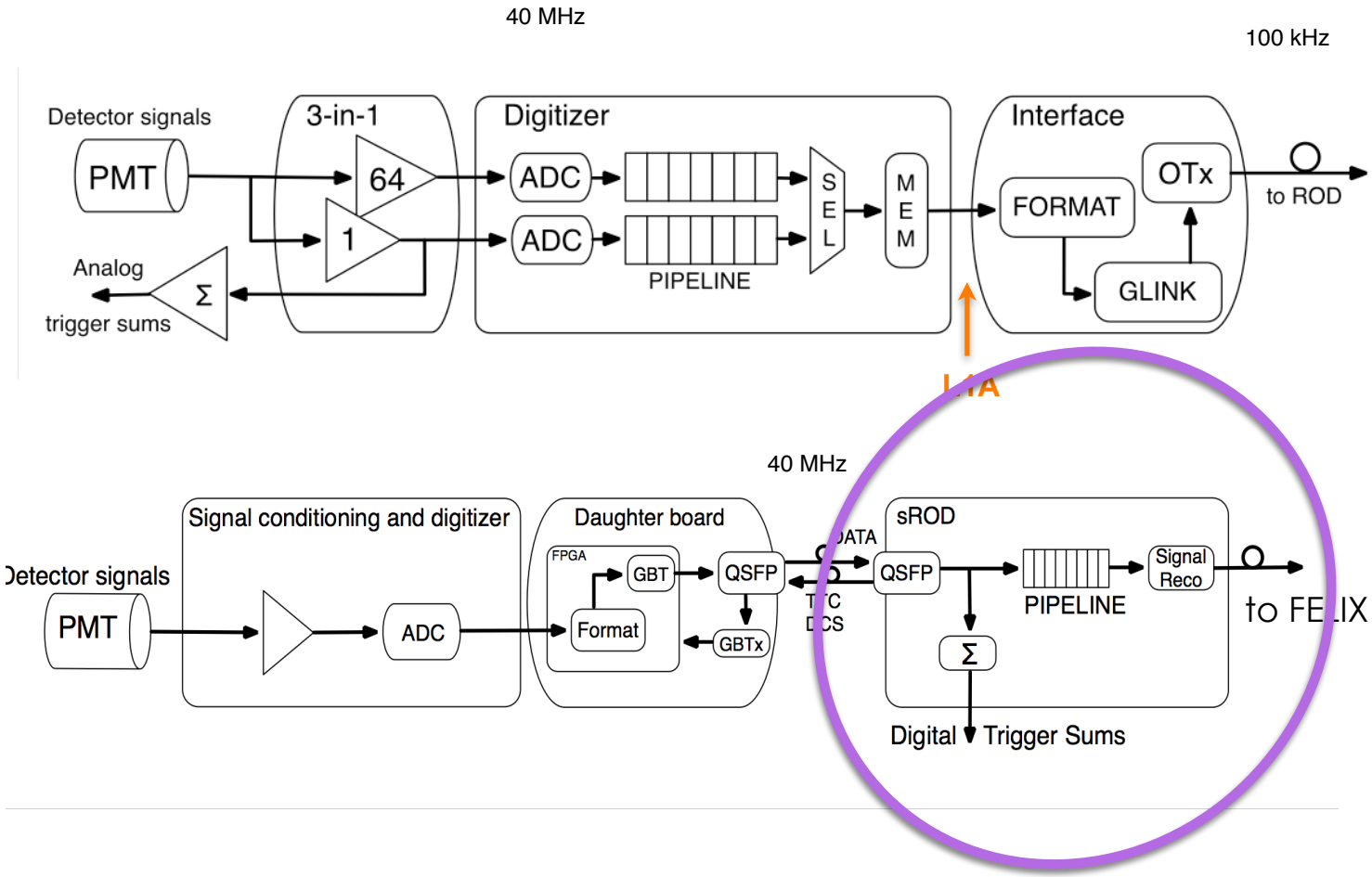
Fund	WBS	Tag	Description	AY k$	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
NSF	**6.5.2.4**	**PPR**	**Preprocessor**	**Total**	**-**	**-**	**63.05**	**183.13**	**196.53**	**199.32**	**46.38**	**-**	**-**	**688.41**
				Labor	-	-	54.25	103.25	92.87	95.66	37.58	-	-	383.61
				Material	-	-	-	71.08	94.86	94.86	-	-	-	260.80
				Travel	-	-	8.80	8.80	8.80	8.80	8.80	-	-	44.00
				CORE	-	-	-	21.08	94.86	94.86	-	-	-	210.80
				FTEs	-	-	0.37	0.91	1.51	1.51	0.23	-	-	4.51
		PPR2010	Final Design	Total										-
				Labor			54.25	-	-	-	-	-	-	54.25
				Material										-
				Travel			8.80							8.80
				CORE	-	-	-	-	-	-	-	-	-	-
				FTEs	-	-	0.37	-	-	-	-	-	-	0.37
		PPR2020	Parts Procurement/Q&A	Total										-
				Labor			-	5.16	-	-	-	-	-	5.16
				Material				21.08						21.08
				Travel										-
				CORE	-	-	-	21.08	-	-	-	-	-	21.08
				FTEs	-	-	-	0.03	-	-	-	-	-	0.03
		PPR2030	Burn-in/Test/repair	Total										-
				Labor			-	82.15	-	-	-	-	-	82.15
				Material										-
				Travel				8.80						8.80
				CORE	-	-	-	-	-	-	-	-	-	-
				FTEs	-	-	-	0.73	-	-	-	-	-	0.73
		PPR2040	Test Equipment fabrication	Total										-
				Labor			-	15.94	-	-	-	-	-	15.94
				Material				50.00						50.00
				Travel										-
				CORE										-
				FTEs	-	-	-	0.14	-	-	-	-	-	0.14
		PPR2050	Parts Procurement/Q&A	Total										-
				Labor			-	-	4.43	4.56	-	-	-	8.99
				Material					94.86	94.86				189.72
				Travel										-
				CORE	-	-	-	-	94.86	94.86	-	-	-	189.72
				FTEs	-	-	-	-	0.03	0.03	-	-	-	0.06
		PPR2060	Burn-in/Test/repair	Total										-
				Labor			-	-	88.44	91.10	37.58	-	-	217.12
				Material										-
				Travel					8.80	8.80	8.80			26.40
				CORE	-	-	-	-	-	-	-	-	-	-
				FTEs	-	-	-	-	1.48	1.48	0.23	-	-	3.18

6.5.2.4 Tile pre-processor

from scoping document

			Production cost for the sROD system				
Item	number/unit	item cost	unit cost in EURO				
ATCA system	**4**	**15000**		**60000**	**4**	**60000**	
Chassis - Shelf							
Shelf Manager							
Power Supply							
sROD blades	**32**	**22300**		**713600**	**40**	**892000**	
Virtex 7	4	2000	8000				
Kintex 7	1	1000	1000				
QSFPs	32	250	8000				
Other components	1	3000	3000				
PCB cost	1	800	800				
Assembly	1	1500	1500				
sROD Transition Module	**32**	**5050**		**161600**	**40**	**202000**	
Kintex 7	1	1000	1000				
MiniPOD Tx-connector L0/L1	4	250	1000				
QSFP Felix2	3	250	750				
Other components	1	1000	1000				
PCB production	1	500	500				
PCB assembly	1	800	800				
Additional TTC, DCS modules per pa	**4**	**10000**		**40000**	**4**	**40000**	
				975200		1194000	EURO
				1170240		1432800	CHF
EURO -> CHF	1.2						
sROD units	34320						
ATCA	18000						

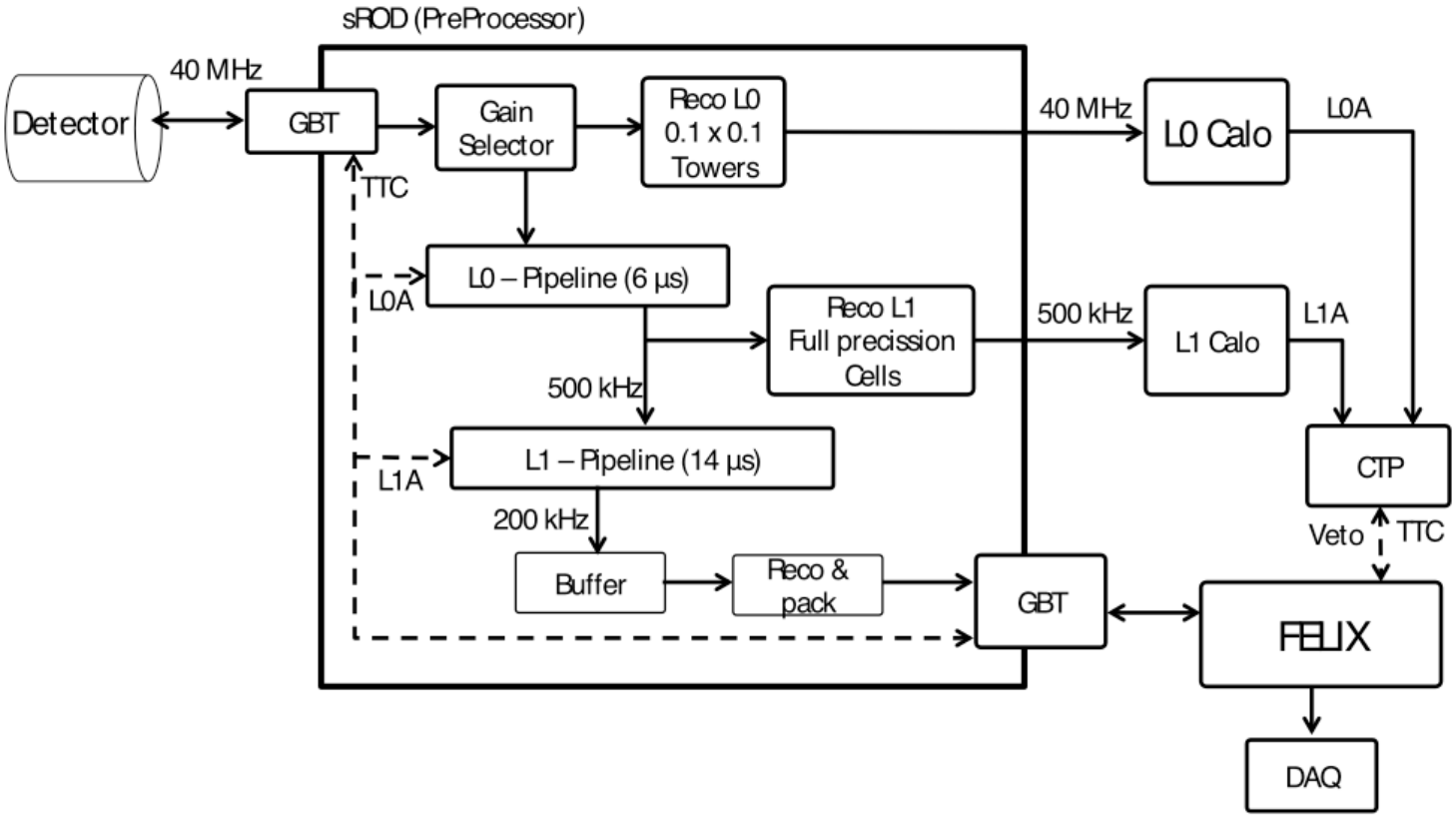
Tile readout changes



Up Link only	Present	Upgrade
Total BW	***~ 165 Gbps***	***~80 Tbps***
Nb fibers	256	8192
Fiber BW	***640 Mbps***	***10 Gbps***
Nb RODs	32	32?
ROD Crates	***4***	***4***
In BW/ROD	5 Gbps	2 Tbps
Out BW/ROD $_{DAQ}$	***2,56 Gbps***	***~ 20 Gbps***
Out BW/ROD $_{L1}$	Analog FE	< 80 Gbps

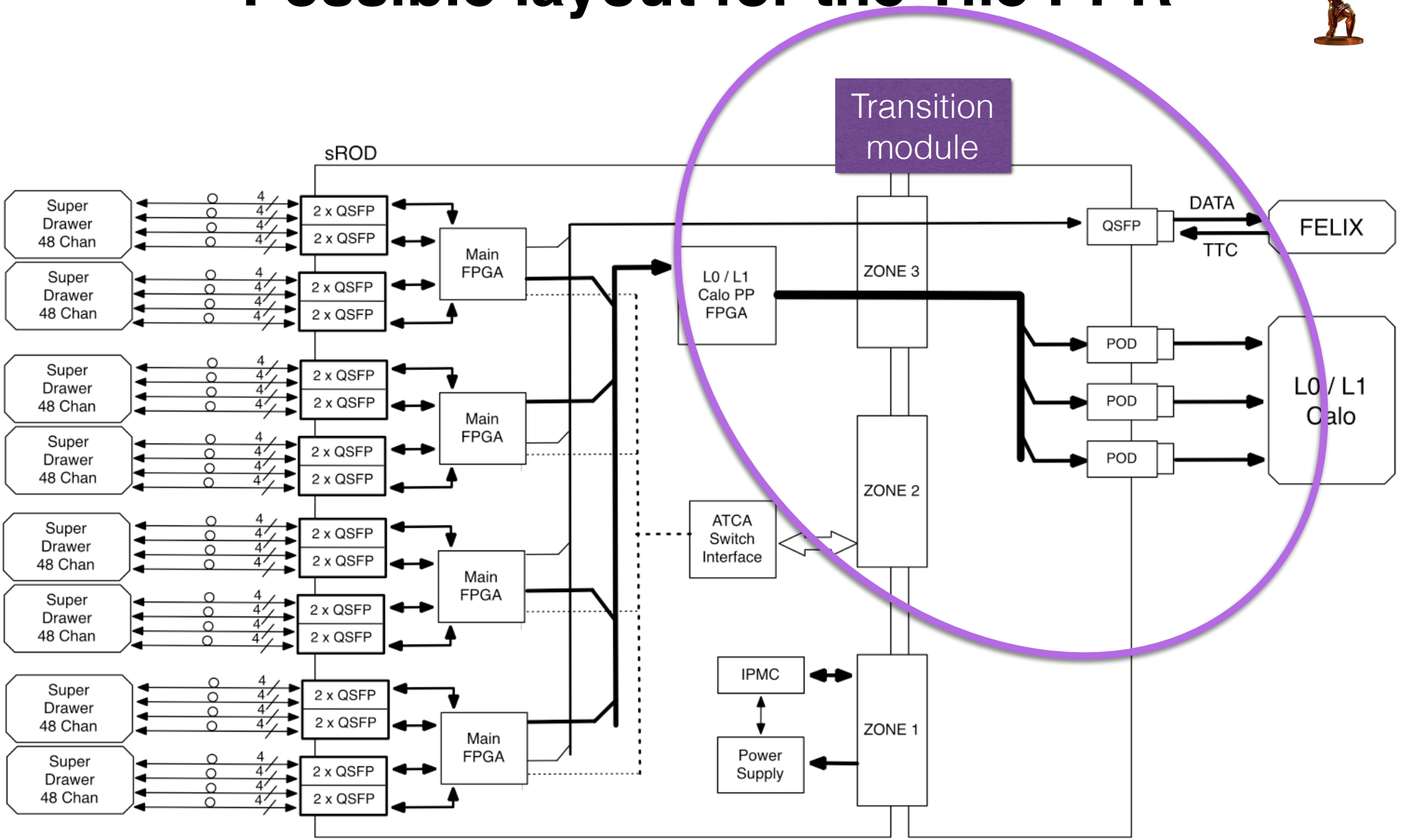
- Complete replacement of on-detector and off-detector electronics
- remove trigger limitation: higher L0/L1 trigger rate, larger latency
- digital trigger information with full granularity and better precision
  - Pipelines and DCS & TTC interfaces moved off-detector

Tile pre-processor



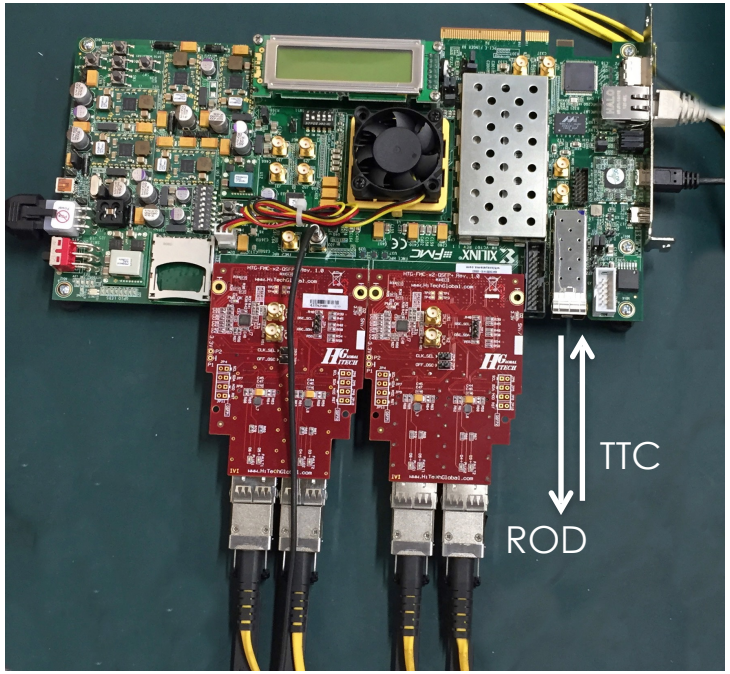
- interface the Front End electronics with the TTC and DCS system
- receive the data @ 40 MHz store in pipelines during L0 and L1 trigger decision
- Signal reconstruction for each channels and data reduction (trigger primitive formation) to input the L0/L1 Calo trigger.

Possible layout for the Tile PPR



PPR prototype for the demonstrator

PPR **prototype**



commercial emulator vc707+QSFP-FMC

- first prototype designed and constructed (mid size AMC:180.6 mm x 148.5 mm)
- now fully functional
- development of firmware is well advanced using the VC707 emulator.
- now firmware migration and integration in the ATCA end of the year

A portable test-bench for validation of phase-II electronics

- A portable readout module for mini-drawers (Prometeo) is under development
  - Stand-alone test-bench to assess the QA of the electronics
- Hardware
  - Based on a Virtex 7 evaluation board
  - QSFP module provides optical connection
  - HV and LED driver boards test response of PMTs
  - 16 channel ADC mezzanine to digitize the output of trigger cables from previous test-bench
- Software
  - Based on IPbus, QT framework
  - Modular implementation to allow particular test implementation
- Status
  - All hardware components in hand,
  - Firmware under design

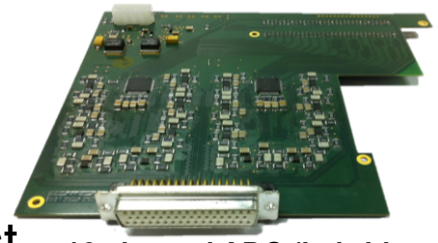
Virtex7 evaluation board

A Portable ReadOut ModulE for Tilecal ElectrOnics
PROMETEO

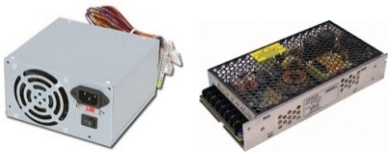
QSFP FMC module

HV PS

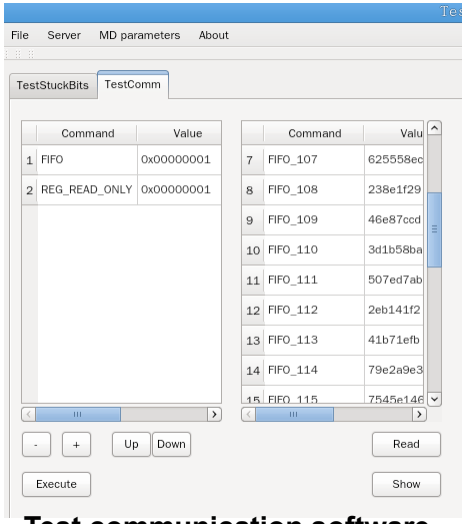
LED driver



16 channel ADC (hybrid demonstrator only)



System power supply (commercial ATX + 24V)



Test communication software panel